

## Claims

What is claimed is:

1. A light source comprising:

- a) a passively Q-switched laser for delivering a pulsed primary beam at a primary wavelength;
- b) a fiber amplifier for receiving said primary beam and amplifying said primary beam to produce a pulsed intermediate beam of intermediate pulses at said primary wavelength, said intermediate pulses having a format calibrated for a predetermined frequency conversion efficiency; and
- c) a nonlinear element for frequency converting said pulsed intermediate beam in a single pass at said predetermined frequency conversion efficiency to produce a pulsed output beam at an output wavelength.

2. The light source of claim 1, wherein said primary wavelength ranges from 860 nm to 1100 nm.

3. The light source of claim 1, wherein said output wavelength ranges from 430 nm to 550 nm.

4. The light source of claim 1, wherein said fiber amplifier is a cladding-pumped amplifier.

5. The light source of claim 4, wherein said cladding-pumped amplifier has a predetermined

3 core section and a predetermined cladding  
4 section.

5  
1 6. The light source of claim 4, wherein said  
2 cladding-pumped amplifier has a length of less  
3 than 2 m.

4  
1 7. The light source of claim 1, wherein said passively  
2 Q-switched laser comprises a saturable absorber Q-  
3 switch.

4  
1 8. The light source of claim 7, wherein said  
2 saturable absorber Q-switch is set such that  
3 said pulsed primary beam comprises primary  
4 pulses with a duty cycle ranging from .01% to  
5 1%.

6  
1 9. The light source of claim 7, wherein said  
2 saturable absorber Q-switch is set such that  
3 said pulsed primary beam comprises primary  
4 pulses having a pulse width and having an  
5 interpulse separation of at least 100 times  
6 said pulse width.

7  
1 10. The light source of claim 7, wherein said  
2 saturable absorber Q-switch is set to operate  
3 said passively Q-switched laser at a primary  
4 pulse repetition rate of at least 100 kHz.  
5

1 11. The light source of claim 1, wherein said nonlinear  
2 element comprises at least one nonlinear optical  
3 crystal.

4  
1 12. The light source of claim 11, wherein said at  
2 least one nonlinear optical crystal comprises a  
3 borate.

4  
1 13. The light source of claim 12, wherein said  
2 borate is selected from the group  
3 consisting of LBO and BBO.

4  
1 14. The light source of claim 1, wherein said  
2 predetermined conversion efficiency is at least 10%.

3  
1 15. The light source of claim 14, wherein said  
2 predetermined conversion efficiency is about  
3 50%.

4  
1 16. A display system having a light source comprising:  
2 a) a passively Q-switched laser for delivering a pulsed  
3 primary beam at a primary wavelength;  
4 b) a fiber amplifier for receiving said primary beam  
5 and amplifying said primary beam to produce a pulsed  
6 intermediate beam with intermediate pulses at said  
7 primary wavelength said intermediate pulses having a  
8 format corresponding to a predetermined frequency  
9 conversion efficiency; and  
10 c) a nonlinear element for frequency converting said  
11 pulsed intermediate beam in a single pass at said

12 predetermined conversion efficiency to produce a  
13 pulsed output beam at an output wavelength.  
14

- 1 17. The display system of claim 16, further comprising:  
2 a) a plurality of display pixels being refreshed  
3 at a refresh rate;  
4 b) a synchronizing mechanism for synchronizing  
5 output pulses of said pulsed output beam with  
6 said refresh rate.  
7

- 1 18. The display system of claim 17, wherein said  
2 synchronizing mechanism synchronizes said  
3 pulses at an integer multiple of said refresh  
4 rate.  
5

- 1 19. The display system of claim 16, wherein said primary  
2 wavelength ranges from 860 nm to 1100 nm.  
3

- 1 20. The display system of claim 16, wherein said output  
2 wavelength ranges from 430 nm to 550 nm.  
3

- 1 21. The display system of claim 16, wherein said fiber  
2 amplifier is a cladding-pumped amplifier.  
3

- 1 22. The display system of claim 21, wherein said  
2 cladding-pumped amplifier has a predetermined  
3 core section and a predetermined cladding  
4 section.  
5

1 23. The display system of claim 21, wherein said  
2 cladding-pumped amplifier has a length of less  
3 than 2 m.  
4

1 24. The display system of claim 16, wherein said  
2 passively Q-switched laser comprises a saturable  
3 absorber Q-switch.  
4

1 25. The display system of claim 24, wherein said  
2 saturable absorber Q-switch is set such that  
3 said pulsed primary beam comprises primary  
4 pulses with a duty cycle ranging from .01% to  
5 1%.  
6

1 26. The display system of claim 24, wherein said  
2 saturable absorber Q-switch is set such that  
3 said pulsed primary beam comprises primary  
4 pulses having a pulse width and an interpulse  
5 separation of at least 100 times said pulse  
6 width.  
7

1 27. The display system of claim 24, wherein said  
2 saturable absorber Q-switch is set to operate  
3 said passively Q-switched laser at a primary  
4 pulse repetition rate of at least 100 kHz.  
5

1 28. The display system of claim 16, wherein said  
2 nonlinear element comprises at least one nonlinear  
3 optical crystal.  
4

1 29. The display system of claim 28, wherein said at  
2 least one nonlinear optical crystal comprises a  
3 borate.

4  
1 30. The display system of claim 29, wherein  
2 said borate is selected from the group  
3 consisting of LBO and BBO.

4  
1 31. The display system of claim 16, wherein said  
2 predetermined conversion efficiency is at least 10%.

3  
1 32. The display system of claim 31, wherein said  
2 predetermined conversion efficiency is about  
3 50%.

4